

Eosinophilic Meningitis

Although eosinophilic meningitis is not a mandatory reportable disease, reporting is recommended to aid in the understanding of its epidemiology and disease burden.

Non-infectious agents, fungi, bacteria, *Rickettsiae*, viruses and multiple parasites have all been linked to eosinophilic meningitis. The principal etiologic agent of human eosinophilic meningitis, however, is *Angiostrongylus cantonensis*.

A. cantonensis, was first detected in rats in Canton, China in 1933. It was then described in the following years in the Western Pacific Region (Micronesia, Melanesia and Polynesia), and in Southeast Asia (Indonesia, Philippines, Taiwan, mainland China, Vietnam, Thailand, Cambodia, Japan, India). Beyond the Indo-Pacific region, this lung worm of rats has been found in rodents in Madagascar, Egypt, Cuba, Puerto Rico and New Orleans, Louisiana (1987). *A. cantonensis* was first reported in the United States in 1985, with a probable introduction by infected rats from ships docking in New Orleans, Louisiana, during the mid-1980s.

The first report of the parasite within North America, (Campbell BG and Little MD, 1988, *Am J Trop Med Hyg.* May; 38(3):568-73), was on the finding of *A. cantonensis* in rats in New Orleans. Twenty of 94 (21.4%) *Rattus norvegicus* trapped in New Orleans, between April, 1986 and February, 1987 were infected with *A. cantonensis* (three to 62 worms per rat).

A carnivorous snail, *Euglandina rosea*, was found experimentally to be able to serve as both an intermediate and a paratenic host. Other locally occurring gastropods that were successfully infected experimentally included: *Mesodon thyroidus*, *Anguispira alternata*, *Bradybaena similis*, *Subulina octona*, *Polygyra triodontoides*, *Vaginulus ameghini*, *Philomycus carolinianus*, *Deroceras laeve*, *Limax flavus*, *Lehmannia poirieri*. Laboratory reared, four to five week-old *M. thyroidus* and *D. laeve* were able to support the development of small numbers of larvae to the third stage.

The first stage larvae of *A. cantonensis* in the feces of experimentally infected rats were found not to migrate out of the fecal pellet; this behavior favors the infection of feces-consuming gastropods. Twenty heavily infected *L. flavus* were observed over a period of two months. The shedding of third stage larvae of *A. cantonensis* was never seen. While factors support the spread of *A. cantonensis* in rats in the southern United States, the probability of human infection is uncertain since the parasite is transmitted primarily by ingestion of raw intermediate and paratenic hosts.

In 1990, *A. cantonensis* was reported in a howler monkey, *Alouatta caraya*, at the Audubon Park and Zoological Gardens, New Orleans, who died 21 days after the initial clinical symptoms. The monkey had access to free-ranging gastropods within the zoo (Gardiner CH et al 1990 *Am J Trop Med Hyg.* Jan;42[1]:70-4 'Eosinophilic meningo-encephalitis Due to *A. cantonensis* as the Cause of Death in Captive Non-human Primates').

A case of autochthonous *A. cantonensis* infection was reported in a child in New Orleans on June 24, 1993. The 11-year-old boy presented to a hospital in New Orleans with myalgia, (which he had had for seven days), headache, low-grade fever, vomiting and a stiff neck. He had always

lived in Louisiana and had not traveled abroad. The CSF showed 215 leukocytes, with eosinophilia at 16% in his blood. On specific questioning, the boy admitted that he had, on a dare, eaten a raw snail from the street some weeks earlier. A serologic test for *A. cantonensis* was positive by enzyme immunoassay (New D, Little MD, Cross J, 1995. *New England J. Medicine* 332 (16):1105)

A. cantonensis was also reported in a horse from Picayune, Mississippi, a distance of 87 km from New Orleans, in a lemur (*Varencia variegata rubra*) from New Iberia, Louisiana, a distance of 222 km from New Orleans and in a wood rat (*Neotoma floridanus*), and four opossums (*Didelphis virginiana*) from Baton Rouge, Louisiana, a distance of 124 km from New Orleans (Kim DY et al 2002, *J. Parasitol* 88(5):1024).

In March, 2006, a 22-year-old male living in Terrebonne Parish, hospitalized for muscle, neck and back aches and hyper-sensitivity to touch was suspected of having meningitis. The CSF showed 304 WBC / μ L with 36% eosinophils, high protein, and low glucose. He was diagnosed as having eosinophilic meningitis. None of the non-parasitic causes of eosinophilic meningitis were found. Nine days before the onset of symptoms, the patient had eaten on a dare, two raw legs from a green tree frog.

In July, 2017, a 23-year-old female living in Orleans Parish presented to an emergency department for headaches, vision changes, and she was afebrile. The headaches worsened while lying flat and gradually increased in severity over the course of a week. The patient initially denied any light sensitivity or neck stiffness; it was not until after further questioning that these symptoms were noted and led to the suspicion of meningitis. It was also learned that the patient had visited another emergency department nine days prior with a one week history of nausea, vomiting, headache, general malaise, and subjective fever. After an MRI showed no abnormalities, a lumbar puncture was performed and the CSF showed an elevated leukocyte count of 383 UL with 62% eosinophils, high protein, and normal glucose. Symptoms improved following the procedure. The CSF subsequently tested positive for *A. cantonensis* by PCR. When interviewed regarding food history, the patient stated that she frequently consumed local seafood and raw produce from a local Asian food market. However, she denied eating any raw or undercooked food.